Reg. No.

Question Paper Code : 66271

M.E. DEGREE EXAMINATION, DECEMBER 2015/JANUARY 2016

First Semester

Power Electronics and Drives

PX7102 : ANALYSIS OF POWER CONVERTERS

(Common to M.E. Control and Instrumentation Engineering)

(Regulations – 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL Questions.

PART – A (10 × 2 = 20 Marks)

1. Write short note on blocking condition of a diode.

2. How are gate turn of thyristors turned on and off ?

3. Define Modulation Index.

4. Does the commutation angle depend on the delay angle of converters ?

5. Write the principle of operation of step down chopper.

6. What are the effects of chopping frequency on filter sizes ?

7. Write short note on tie control arrangement.

8. Mention the advantages of delta connected controllers.

9. Write the principle of operation of cycloconverters.

10. What is meant by matrix converters ?

PART – B (5 × 13 = 65 Marks)

11. (a) Explain the concept of extinction angle control of commutation technique of converters.

OR

(b) Demonstrate the operation of single phase fully controlled converters during RLE loads with its characteristics.

12. (a) With a neat sketch, explain the operation and characteristics of three phase dual converter.

OR

(b) Illustrate the operation of three phase half controlled converter with free wheeling diodes.

13. (a) Demonstrate the operation and characteristics of step up DC chopper with RL load.

OR

(b) Derive necessary equations and explain the operation of buck boost converters with its advantages.

14. (a) Explain the operation of phase control technique with neat sketch.

OR

(b) Demonstrate the operation of single phase bidirectional controller with RL loads.

15. (a) With neat sketch, illustrate the operation of three phase dual converters.

OR

(b) Explain the operation and characteristics of single phase cycloconverter with neat sketch.

PART – C (1 × 15 = 15 Marks)

16. (a) A three phase full converter is supplied from a three phase 230 V, 60 Hz supply. The load current is continuous and has negligible ripple. If the average load current I_{dc} = 125 A and the commutating inductance L_c = 0.1 mH, determine the overlap angle when (a) a = 15°, (b) a = 30° and (c) a = 65°.

OR

(b) A highly inductive load is controlled by a chopper. The average load current id I_a = 100 A and the load ripple current can be considered negligible (ΔI = 0). A simple LC input filter with L_e = 0.3 mH and C_e = 4500 μF is used. If the chopper is operated at a frequency of 350 Hz and a duty cycle of 0.5, determine the maximum RMS value of the fundamental component of chopper-generated harmonic current.

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